REMARKS/ARGUMENTS

Claim Amendments

Applicant has amended claims 5 and 6 to correct typographical errors (extraneous dashed lines). Applicant respectfully submits that such claim amendments have no bearing, whatsoever, on the scope of such claims.

Restriction Requirement

The Examiner indicated that restriction between Group I, claims 2-10, and Group II, Claims 11-14, was required as "[t]he inventions listed as Groups I-II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the common technical feature in all groups deal with the inhibition of one or more enzymes selected from the group consisting of tryptophan aminotransferase, indole-3-pyruvate decarboxylase, and indole-3-acetaldehyde oxidase … Miyata teaches that indole-3-acetaldehyde oxidase is strongly inhibited by p-hydroxymercuribenzoate, cyanide, and hydroxylamine. The invention of the instant application lacks a special corresponding technical feature and does not make a contribution to the prior art. Therefore the claims cannot be said to have unity of invention. Applicant provisionally elects Group I, claims 2-10, for further prosecution on the merits and respectfully traverses the restriction requirement.

Applicant respectfully submits that the Examiner has failed to consider the claims as a whole and has further mischaracterized the corresponding special technical feature as "the inhibition of one or more enzymes selected from the group consisting of tryptophan aminotransferase, indole-3-pyruvate decarboxylase, and indole-3-acetaldehyde oxidase." In this regard, it should be appreciated that independent claim 2 and independent claim 11 each relate to methods and compounds/substances having *herbicidal* activity. Along this line, claim 2 relates to a method for identifying *herbicidally* active substances, which comprises steps a-d. Similarly, amended claim 11 relates to a method of controlling undesirable vegetation comprising applying a compound with *herbicidal* or growth-regulatory activity. Accordingly, contrary to the

Examiner's assertion, the corresponding special technical feature is not limited to "the inhibition of one or more enzymes selected from the group consisting of tryptophan aminotransferase, indole-3-pyruvate decarboxylase, and indole-3-acetaldehyde oxidase," but rather relates to methods of controlling undesired vegetation and weeds using compounds and substances having *herbicidal* activity. By contrast, Miyata is directed to the indole-3-actealdehyde oxidase of pea seedlings, which are well understood by ordinarily skilled artisans as NOT comprising weeds and/or undesired vegetation. In this regard, Miyata does not disclose or describe methods of identifying herbicidal compounds and/or methods for controlling undesired vegetation, but rather, simply describes studies related to the enzymatic properties of pea seedlings. It should be understood that Miyata describes studies that are performed on partially purified enzymes and does not describe studies that are performed on living tissues (See Abstract). Accordingly, there is no mention of herbicidal activity. Additionally, Miyata specifically describes that indole-3-oxidase functions differently in various plants (See Miyata, pages 404 and 405 (for example, see last sentence of results and discussion reciting, "[h]owever, the pea enzyme appears to be different from the Avena enzyme with respect to its pH optimum and substrate specificity.")). Consequently, the aforementioned sets forth the fact that the actual enzyme is different, or functions differently, in a number of such that Miyata teaches away from using such enzyme as a target for herbicides. In view of the teachings of Miyata, a skilled artisan would not recognize that influence of the enzyme pathway would have any herbicidal effect, that is, Miyata results and conclusions specifically sets forth that there is no reasonable expectation of success. Moreover, in view of the disclosure of Miyata, a skilled artisan would not be able to ascertain whether influencing such enzymes would result in mortality of undesired vegetation, i.e., herbicidal activity, or whether such influence would result in the mortality of desired vegetation. Finally, it should be appreciated that plant metabolic processes are typically redundant, i.e., if a first pathway does not function, the plant may use another, such that affects on one enzymatic system may not have herbicidal effects on a plant as a whole.

Accordingly, Applicant respectfully submits that Miyata fails to describe each and every element of Group I and Group II claims such that they share the same corresponding special technical features which makes a contribution over the prior art. Groups I and II are, thus, so

related as to form a general inventive concept in accordance with PCT rules 13.1 and 13.2. The restriction requirement should be withdrawn and all claims examined.

Claim Rejections under 35 USC § 103

1.) The Examiner rejected claims 2-4 under 35 USC § 103 as allegedly obvious in view of Bower, Anderson, Rapparini, Normanly, Koshiba (I) and Koshiba (II). More specifically, the Examiner asserted that "[i]t would have been obvious to a person having ordinary skill in the art at the time of the instant application to combine the teachings of Bower et al., Anderson et al., Rapparini et al., and Koshiba (I and II) et al. to devise a method for identifying a herbicidally active substance comprising the steps mentioned above. The biosynthesis of the key auxin, indole-3-acetic acid (IAA), is tryptophan-dependent (as shown in scheme I). The enzymes tryptophan aminotransferase, indole-3-acetaldehyde oxidase, and indole-3-pyruvate decarboxylase are involved in IAA synthesis. A compound or substrate that can inhibit (by binding to the enzyme or to the nucleic acid sequence encoding the enzyme) these enzymes would therefore inhibit the production of IAA and subsequently prevent plant growth." Applicant respectfully traverses the rejection.

While the U.S. Supreme Court indicated that "[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents[,]"[1] the Court, nonetheless, made it clear that an inquiry into whether there was "a teaching, suggestion, or motivation to combine known elements [provides] a helpful insight."[2] Such an inquiry helps to uphold the well-settled principle that an invention "composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art."[3] Along this line, "[a] factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautions of arguments reliant upon

[1] *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, ___, slip op. at 15, 127 S.Ct. 1727, 1741 (2007).
[2] *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, ___, slip op. at 15, 127 S.Ct. 1727, 1741 (2007).
[3] *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, ___, slip op. at 14, 127 S.Ct. 1727, 1731 (2007).

ex post reasoning. Rigid preventative rules that deny factfinders recourse to common sense, however, are neither necessary under [Supreme Court] caselaw nor consistent with it."[4] Notwithstanding, it remains impermissible to utilize an Applicant's disclosure as a blueprint to reconstruct the claimed invention from the isolated teachings of the prior art[5] and it also remains "impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art."[6] That is, the prior art references must be considered as a whole, including those portions that lead away from the claimed invention.[7]

In the instant case, Applicant respectfully submits that the Examiner has rendered the instant claims obvious "merely by demonstrating that each of its elements was, independently, known in the prior art,"[8] and has used "that which only the inventor taught … against its teacher."[9]

The Examiner cited the Bowers reference as teaching the inhibition of indolacetaldehyde oxidase in cucumber. However, Bowers merely describes a study of indolacetaldehyde oxidase and does not address herbicidal activity, the behavior/activity of the enzyme in a living plant, or methods of identifying herbicidally active substances. Along this line, Bowers describes *in vitro* activity of indolacetaldehyde oxidase, does not describe *in vivo* behavior of the enzyme, and does not suggest that indolacetaldehyde oxidase can be used as a target for herbicidal activity. Further, given the redundancy and variation in metabolic pathways and processes (See discussion related to Rapparini and Normanly), an ordinarily skilled artisan would not look to indolacetaldehyde oxidase as a target for herbicidal activity. Furthermore, Bowers relates to cucumber seedlings, which would be readily recognized by a skilled artisan as comprising a desirable plant and not an undesirable plant for which a herbicide would be sought. Finally,

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[4] *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. ___, ___, slip op. at 17, 127 S.Ct. 1727, 1742 (2007).
[5] *See, e.g., Grain Processing Corp. v. American Maize-Prods. Co.*, 840 F.2d 902, 907, 5 USPQ2d 1788, 1792 (Fed. Cir. 1988).
[6] *In re Wesslau*, 353 F.2d 238, 241 (C.C.P.A. 1965).
[7] *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).
[8] Slip op. at 14.

while the Bowers reference describes indoleacetaldehyde oxidase as possibly controlling cucumber growth, Bowers merely describes controlling growth and does not describe targeting an enzyme system with a substance to provide herbicidal activity. In this regard, such targeting would be undesirable context of a useful plant, such as cucumber. Accordingly, Bowers does not contain a teaching, suggestion or motivation to create the invention claims 2 and 11.

With regard to Anderson, the Anderson reference describes compounds that potentiate the herbicidal activity of herbicides that effect auxin *transport* and there is no discussion of the production of auxin. Accordingly, there is no teaching or suggestion of the enzymes tryptophan aminotransferase, indole-3-pyruvate decarboxylase and indole-3-acetaldehyde oxidase or bringing such enzymes into contact with one or more test substances. Along this line, Anderson effectively teaches away from the instant claimed invention in that it specifically relates to the control of undesirable plants (weeds) by means of a wholly different mechanism. Accordingly, in view of such reference, a skilled artisan would seek to control undesirable plants via transport mechanisms and not biosynthetic pathways. Furthermore, as a skilled artisan would appreciate that organisms typically comprise redundant biosynthetic pathways, such that such individual would not be motivated, in view of Anderson, to seek biosynthetic pathways as avenues to control undesirable vegetation.

With regard to Rapparini, Rapparini describes studies related to growth temperature and while it describes indole-3-actetic acid (IAA), it does not discuss either of tryptophan aminotransferase, indole-3-pyruvate decarboxylase or indole-3-acetaldehyde oxidase and does not even describe the synthesis of IAA. Accordingly, there is simply no discussion of methods for identifying herbicidal active substances and/or substances that interact with indole-3-acetaldehyde. Furthermore, the experimental data described by Rapparini tends to teach away from the instant claimed invention. That is, page 1141 describes that *L. gibba* died within 2 days at 40 degrees Celsius. Weeds and other undesirable plants are generally recognized as being more resilient when compared with cultured plants. Accordingly, they will not typically die as a result of a 2 day exposure at 40 degrees Celsius - this tends to suggest that the metabolism of *L.*

[9] *See , e.g. , W.L. Gore & Assoc., Inc. v. Garlock, Inc.* , 721 F.2d 1540, 1553, 220 UPSQ 303, 313 (Fed. Cir. 1983).

gibba is different from that of weeds and other undesirable plants. Further, Rapparini addresses the issue that metabolic pathways are not fixed, but can change based on environmental conditions and/or that the IAA pathway can be different in different plant species (See page 1411, "we have found that temperature does alter the predominant pathway for IAA biosynthesis;" See also, page 1413, "…the possibility that some metabolic change is occurring at a transition point between 15° C and 25° C … a switch from Trp-dependent IAA production at lower temperatures to Trp-independent biosynthesis at elevated temperatures; Page 1414, "However, a change in IAA pathway occurs … [t]hus the relationship between IAA levels and pathways does not appear to be a simple one … . How selective activation of specific pathways for IAA biosynthesis relates to the ability of plants to sense and respond remains an important question."). Accordingly, the above teaches away from using IAA precursors as targets for herbicides due to pathway changes resulting from temperature and/or differences among species of plant.

With regard to Normanly, this reference relates to indole-3-aqcetic acid, its conjugates and its follow-up products and makes no mention of the enzymes according to the instant claims. Similar to Rapparini, Normanly describes that the IAA pathway differs among plant varieties (See, e.g., page 437, "This is in contrast to what is found in other fruits.") Accordingly, there is simply no teaching or suggestion of method for identifying herbicidally active substances, the IAA pathway or "bringing one or more enzymes selected from the group consisting of the enzymes tryptophan aminotransferase, indole-3-pyruvate decarboxylase and indole-3-acetaldehyde oxidase into contact with one or more test substances under conditions which permit the binding of the test substance(s)."

With regard to Koshiba I, this reference describes *in vitro* studies of enzymes in useful, cultured plants (*Zea mays*) and specifically states that "…efforts to establish the pathway of IAA biosynthesis in pant have not yielded conclusive evidence." (Page 1319). Similar to Bowers, this reference does not describe *in vivo* studies. In this regard, the Abstract indicates that the optimum temperature for the IAA-forming system as well as the IAAld oxidase was 50-60 degree Celsius, which temperature is typically much too high for actual plants subject to such temperatures for extended periods. Additionally, Koshiba I does not teach or suggest methods

for identifying herbicidally active substances.

Koshiba II describes the introduction of a gene into a plant for purposes of increasing the activity of auxin production. Along this line, the reference relates to enhancing useful plants and is not directed to affecting weeds and/or other undesirable plants. Additionally, Koshiba II is directed to genes and is not concerned with identifying herbicidally active substances. Accordingly, Koshiba II does not contain a teaching or suggestion of methods of identifying herbicidally active substances by bringing one or more enzymes selected from the group consisting of the enzymes tryptophan aminotransferase, indole-3-pyruvate decarboxylase and indole-3-acetaldehyde oxidase into contact with one or more test substances.

Accordingly, absent the Applicant's very own disclosure, upon considering the references as a whole, including those portions that teach way from the claimed invention, it is seen that there is simply no suggestion or motivation in the cited references, or that knowledge generally available to the skilled artisan at the time the invention was made, to combine/modify the reference teachings in the manner of the Applicant to arrive at the claimed invention. In sum, none of the references cited by the Examiner discuss or address herbicidal activity, the behavior and/or activity of tryptophan aminotransferase, indole-3-pyruvate decarboxylase and indole-3-acetaldehyde oxidase in living plants, or methods of identifying herbicidally active substances. In fact, several of the cited references teach away from the invention of claim 2 and those claims depending therefrom.

In of the above, Applicant respectfully submits that Claim 2 and those claims are nonobvious such that the rejection should be reversed.

2. The Examiner rejected claims 2 and 5-7 under 35 USC § 103 as allegedly obvious in view of Bower, Anderson, Rapparini, Normanly, Koshiba (I and II) and Bode. More specifically, the Examiner asserted that "[i]t would have been obvious to a person of ordinary skill in the art to combine the teachings of Anderson et al. and Bode et al. to determine the activity of an enzyme by measuring the concentration of another enzyme that is involved in the same biosynthesis in which it is involved. In a chemical reaction, where a specific substrate for that specific enzyme is used, there will naturally be a decrease in the concentration or amount of

product formed. Measuring the amount of the formed products that play a role in this same reaction scheme determines if that substrate affects the overall reaction scheme that indicates if the substrate successfully blocked the activity of the enzyme. Additionally, this is a common method of one skilled in the art to measure enzyme activity." Applicant respectfully traverses the rejection.

With the exception of Bode, Applicant has previously discussed the cited references. Applicant respectfully submits that Bode describes the use of tryptophan aminotransferase for the *production* of indol-pyruvate. Accordingly, Bode is wholly contrary to the underlying principles of claim 2 and teaches away from using tryptophan aminotransferase in methods of identifying herbicidally active substances.

Accordingly, Claim 2 and those claims depending therefrom are nonobvious in view of the references such that the rejection should be withdrawn.

3. The Examiner rejected claims 2 and 8-10 under 35 USC § 103 as allegedly obvious in view of Bower, Anderson, Rapparini, Normanly, Koshiba (I and II) and Vanmaele. More specifically, the Examiner asserted that [i]t would have been obvious to a person of ordinary skill in the art at the time of the instant application to combined the teachings of Anderson et al,, Koshiba et al., and Vanmaele et al. to devise a method of identifying [a] herbicidally active substance where the enzymatic activity is determined spectroscopically and the test substances are identified in the form of a high-throughput screening. HPLC is a popular analytic method because it is not limited to the volatility or stability of the sample compound and it has many applications including separation, identification, purification, and quantification of various compounds. HTS is another commonly used, popular method where discreet compounds are tested in parallel so that large numbers of test compounds are screened for useful properties." Applicant respectfully traverses the rejection.

With the exception of Vanmaele, Applicant has previously discussed the cited references. Vanmaele further describes a carrier material that can be used fro screening process and does not discuss or suggest methods of identifying herbicidally active substances. Accordingly, for the reasons previously set forth, claim 2 and those claims depending therefrom are nonobvious in

further view of Vanmaele.

The rejection should be withdrawn.

Conclusion

Applicant respectfully submits that the present application is in condition for allowance, which action is courteously requested. Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees to Deposit Account No. 14-1437. Please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachments
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